SEMINAR NOTICE

Department of Physics and Engineering Physics
University of Saskatchewan

SPEAKER: Devin Huyghebaert, PhD Candidate,
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TOPIC*:* ***Investigations of Near-Earth Space using a Highly Advanced Newly Developed Auroral E-region Radar***

DATE: March 20th, 2018

TIME: 3:30-4:30 p.m.

PLACE: Physics 103

ABSTRACT:

Outer space begins at about 100 km altitude above the Earth in the ionosphere, the layer immediately above the neutral atmosphere. The first ionospheric layer in this near-Earth space environment is the E-region. The E-region is the transition region between the neutral atmosphere we live in and outer space; however, E-region dynamics are dominated by space phenomena.

One of the best methods to study the dynamics of the E-region is by using radar --- specifically VHF (Very High Frequency) radars, which are very sensitive to detecting the dynamic structures within the E-region. To this end, a highly advanced E-region radar has recently been developed at the University of Saskatchewan as part of my Ph.D. thesis, becoming operational in December, 2017. This new auroral radar is known as the Ionospheric Continuous-wave E-region Bi-static Experimental Auroral Radar (ICEBEAR). The ICEBEAR radar implements new and highly advanced radar techniques such as: using a continuous wave (CW) phase modulated signal for high temporal and spatial resolution, using a bi-static configuration, using advanced digital hardware to be able to control each transmitter path and antenna remotely and to directly sample the received signal at high data rates from each receiver antenna, and using GPS clocks and distributed timing systems to have each site highly synchronized in time. The integration and implementation of all these advanced radar techniques gives the ICEBEAR radar unprecedented temporal (100 ms or better) and spatial resolution (1.5 km or better) in a large 400 km by 600 km radar field-of-view and allows the use of advanced interferometry for additional spatial information. The observational abilities of ICEBEAR are unique and will significantly advance understanding of the physics of the E-region.

This seminar will include a description of ionospheric radars and their observational abilities, as well as the design and construction of the state-of-the-art ICEBEAR radar. Lastly, recent ICEBEAR observations showing new and unique highly detailed E-region phenomena will be presented and discussed.

Coffee and Cookies will be served in Physics lounge at 3:00 p.m. for those attending the seminar.